# TED05 – (Part E9) Further Ozone for HL

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. E.9.1 **Explain** the dependence of O2 and O3 dissociation on the wavelength of light. (3) *λ = 242 nm O2* 🡪 *2O•, λ = 330 nm O3* 🡪 *O2 + O•. The energy needed should be related to the bonding in O2 and O3.*
   1. Provide the speed of light equation:
   2. How do λ and *f* have inverse relationships? (A few diagrams may help)
   3. The energy of a wave is directly associate to the *f* of a wave. What equation can help to explain this?
   4. It takes more energy to break apart O­2 than O3, explain (being sure to mention the resonance of O3) :
2. E.9.2 **Describe** the mechanism in the catalysis of O3 depletion by CFCs and NOx. (2) *For example: CCl2F2* 🡪 *CClF2 + Cl•, Cl• + O3* 🡪 *ClO•+ O2, ClO• + O•* 🡪 *O2 + Cl•. AND NO + O3* 🡪 *NO2 + O2, NO2 + O•* 🡪 *NO + O2. The net effect is: O3 + O•* 🡪 *2O2.* 
   1. As discussed with the SL material, ozone can be depleted by the presence of CFC’s in the upper atmosphere by producing highly reactive chlorine radicals. Provide a series of equations to show the depletion of ozone from CFC’s.
   2. The Chlorine radical is eventually stopped from depleting more ozone when it becomes ‘locked-up’ in ‘sink’ compounds. Provide several instances in which chlorine containing compounds can become “stable.” You will see these referred to later in the lecture (E9.3).
   3. A series of reactions also allow nitrogen containing compounds to deplete ozone, provide these reactions:
3. E.9.3 **Outline** the reasons for greater ozone depletion in polar regions. (2) *Consider the seasonal variation in temperature in the upper atmosphere. Refer to surface catalysis on ice particles.*
   1. How is it that most CFC’s are produced in temperate regions buy the majority of ozone damage is confined to the polar regions?
   2. It has been reported that ozone depletion occurs fastest in spring months due to the polar vortex. Explain (using a diagram and explanation) what the polar vortex is:
   3. What are the polar stratospheric clouds? What chlorine containing compound do they build up?
   4. At the poles, what happens in the **winter/spring** months? What chlorine containing compound is favored?
   5. At the poles, what happens in the **summer** months? What chlorine containing compound is favored